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BASIC LEVEL FULL SYLLABUS TEST -1 (GATE 2023) - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

ALL(65) | CORRECT(44) | INCORRECT(14) | SKIPPED(7)

Q. 61 Have any Doubt ?

Consider $F(P_1, P_2, P_3, ..., P_n) = P_1 \Rightarrow (P_2 \Rightarrow (P_3 \Rightarrow ..... \Rightarrow P_n))).....)$
It can be observed that $F(P_2, P_1, P_3, ..., P_n)$ is also equivalent to $F(P_1, P_2, P_3, ..., P_n)$.
Then, how many permutations of $x_1, x_2, x_3 ..... x_n$ (where each $x_i \in \{P_1, P_2, P_3, ..., P_n\}$, and $x_i \neq x_j \ \forall i, j$) exist such that $F(x_1, x_2, x_3, ..., x_n) \equiv F(P_1, P_2, P_3, ..., P_n)$ for $n = 7$?

720 — Correct Option

Solution :
720
$P_1 \Rightarrow (P_2 \Rightarrow (P_3 \Rightarrow ..... \Rightarrow P_n))).....)$ is equivalent to $(P_1 \wedge P_2 \wedge P_3 \wedge ..... \wedge P_{n-1}) \Rightarrow P_n$
So, all permutations of $P_1, P_2, P_3 ..... P_n$ ending with P_n will be equivalent to $F(P_1, P_2, P_3, ... P_n)$.
Therefore the required number of permutations = $(n - 1)!$
Putting $n = 7$ gives 6! i.e. 720.

QUESTION ANALYTICS +

Q. 62 Have any Doubt ?

The main memory of a computer has 4 cm blocks while the cache has 2c blocks. If the cache uses the set associative mapping scheme with 2 blocks per set, then block k of the main memory maps to the set:

A. (k mod m) of the cache — Your answer is **IN-CORRECT**

B. (k mod c) of the cache — Correct Option

Solution :
(b)

$$\text{Number of sets} = \frac{\text{Number of blocks}}{\text{Associativity}} = \frac{2c}{2} = c$$

So block k of the main memory will map to the set k mod c of the cache.

C. (k mod $2c$) of the cache

D. (k mod 2 cm) of the cache

QUESTION ANALYTICS +

Q. 63 Have any Doubt ?

For a host machine that uses the token bucket algorithm for congestion control, the token bucket has a capacity of 10 megabyte and the maximum output rate is 20 megabytes per second. Tokens arrive at a rate to sustain output at a rate of 10 megabytes per second. The token bucket is currently full and the machine needs to send 120 megabytes of data. The minimum time required to transmit the data is _____ seconds.

12 — Correct Option

Solution :
12

$$\text{Time required to fill the token bucket} = \frac{10}{(20-10)} = \frac{10}{10} = 1 \text{ second}$$

So in one second, 10 MB will be transmitted and the token bucket will be full by then, and beyond this point, the output will be dictated by the rate at which tokens arrive, that is 10 MB per second.
So we're left with 110 MB and we can now only transmit data at 10 MB/sec, hence it will take

$\frac{110}{10}$ = 11 seconds more to transmit the data.

So, Total time = 1 + 11 = 12 seconds
Hence 12 is the answer.

Your Answer is 11

QUESTION ANALYTICS +

Q. 64 Have any Doubt ?

Consider a system having a 64 bit virtual address and a 64 KB page size. A program running on the system uses addresses only in the range 0 ..... 4 GB. If system uses 4 level paging such that the page number bits are split equally across the four levels, then the amount of space required to store the page tables (in KB) is equal to

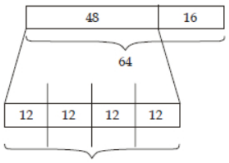
A 1024 KB

B 512 KB

C 608 KB — Correct Option

Solution :
(c)

Virtual address:



Number of pages required to store 4 GB = $\frac{4\text{ GB}}{64\text{ KB}} = \frac{2^{32}\text{ B}}{2^{16}\text{ B}} = 2^{16}$ pages

Number of entries in 1 page table = 2^{12} (same for all levels)

Number of page tables needed at the innermost level (level 4)

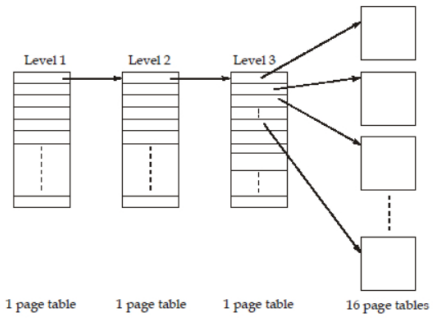
$$= \left\lceil \frac{2^{16}}{2^{12}} \right\rceil = 16 \text{ page tables}$$

$$\text{At level 3} = \left\lceil \frac{16}{2^{12}} \right\rceil = 1$$

$$\text{Similarly at level 2} = \left\lceil \frac{1}{2^{12}} \right\rceil = 1$$

$$\text{Finally at level 1} = \left\lceil \frac{1}{2^{12}} \right\rceil = 1$$

Page table organization:



Therefore, space required for storing page tables

$= (16 + 1 + 1 + 1) \times (\text{Size of one page table})$

$= 19 \times (2^{12} \times 8\text{ B}) = 608\text{ KB}$

D 1536 KB

QUESTION ANALYTICS +

Q. 65 Have any Doubt ?

Consider 3 transactions T_1, T_2, T_3 as follows:

$T_1 : r_1(A),\ w_1(A),\ r_1(B),\ w_1(B)$

$T_2 : r_2(A),\ w_2(B)$

$T_3 : r_3(B),\ w_3(B),\ r_3(A)$

Out of all possible concurrent schedules between T_1, T_2, T_3, a schedule is chosen at random. Then the probability that the schedule starts with T1's first read operation

Out of all possible concurrent schedules between T_1, T_2, T_3, a schedule is chosen at random. Then the probability that the schedule starts with T_1's first read operation and ends with T_1's last write operation is _____. [Rounded to 2 decimal places]

0.16 [0.16 - 0.17] Correct Option

Solution :

0.16 [0.16 - 0.17]

$r_1(A)$ _ $w_1(B)$

After placing the first and last operation of T_1 into our schedule, we're left with 2, 2 and 3 operations of T_1, T_2, T_3 respectively.

We know, number of concurrent schedules = $\frac{(m+n+p)!}{m!\,n!\,p!}$

Putting m, n, p as 2, 2, 3, we get $\frac{7!}{2!\,2!\,3!} = 210$

[Concurrent schedules which start and end with T_1]

(Total number of concurrent schedules possible between T_1, T_2 and T_3) = $\frac{9!}{4!\,2!\,3!} = 1260$

Therefore, required probability = $\frac{210}{1260} = \left(\frac{1}{6}\right) = 0.16$

QUESTION ANALYTICS +